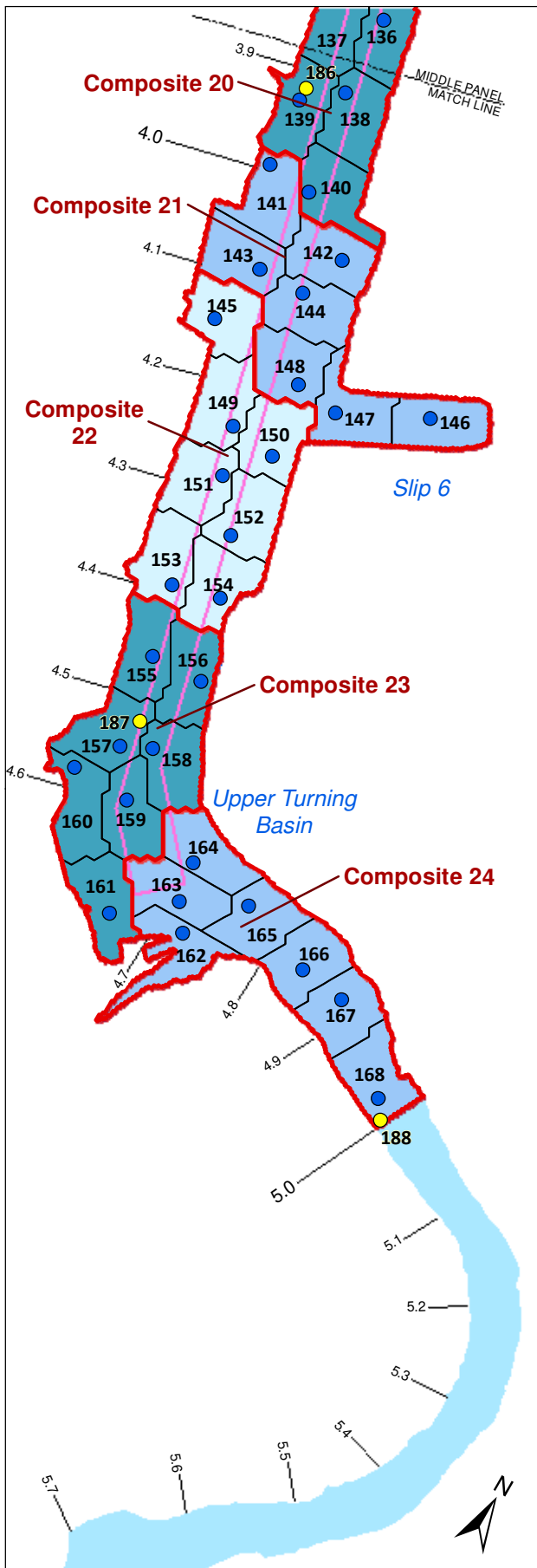
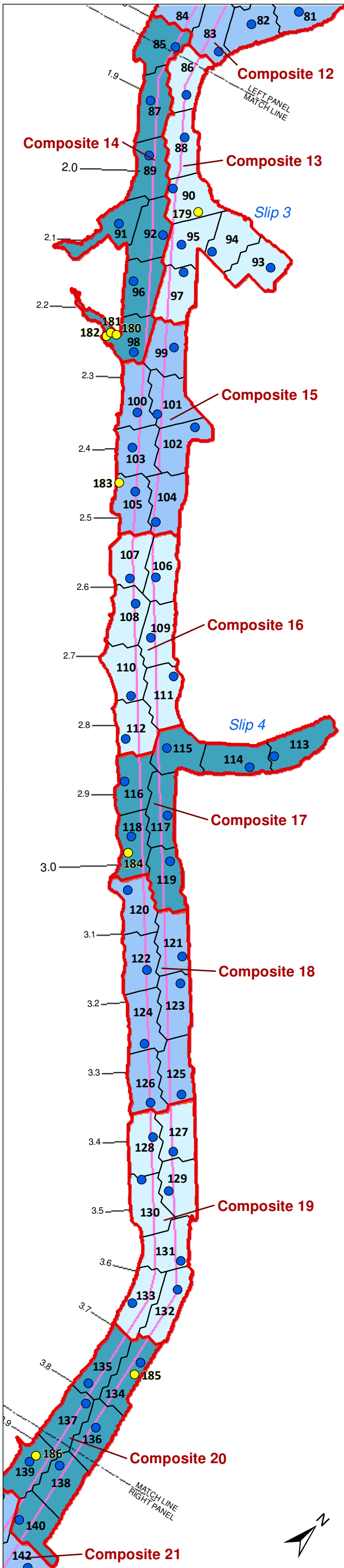
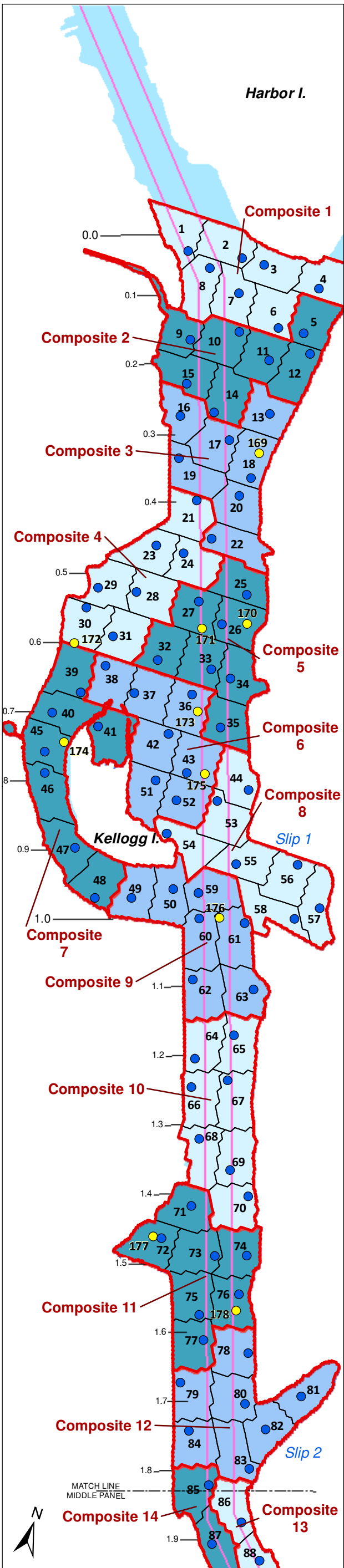


Prepared by craigh, 2/14/2018, W:\Projects\Duwamish AOCs\GIS\Maps and Analyses\Task 03 QAPPs\Surface Sediment\Map 4-1 651b Surface sediment compositing plan.mxd



Baseline surface sediment location (0-10 cm)

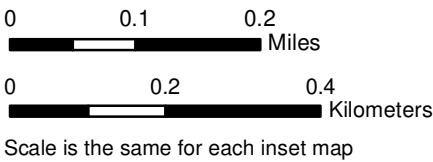
- Random location
- Reoccupied location
- Composite area
- Sampling area
- Navigation Channel
- River mile

Note: Shading indicates sampling areas combined into composites.

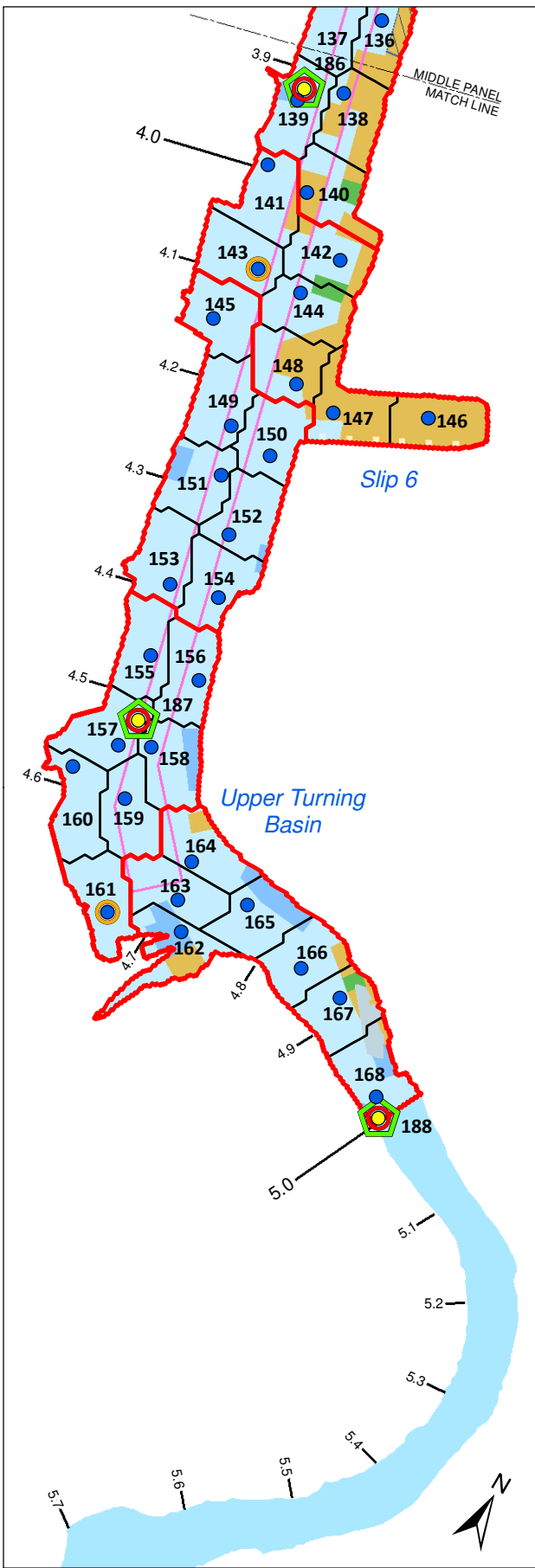
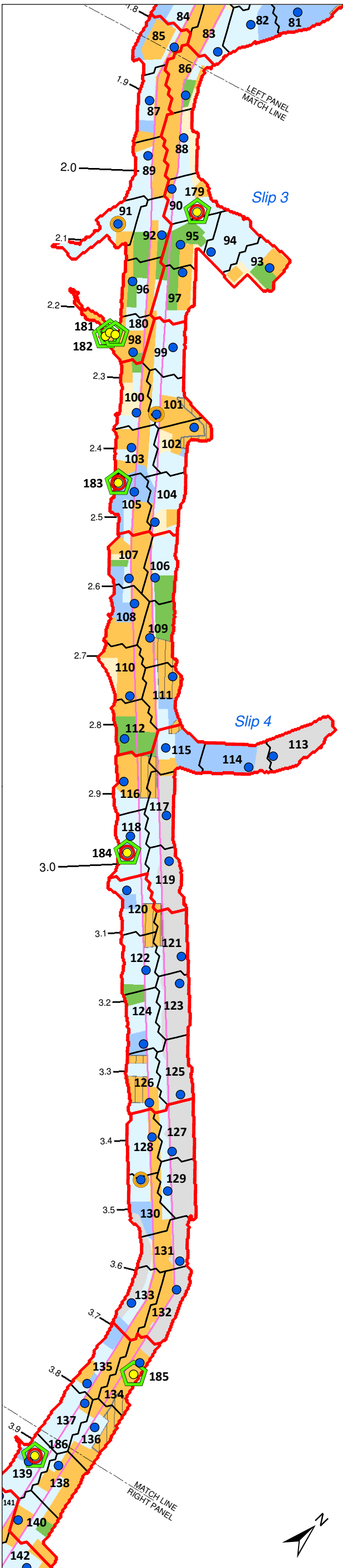
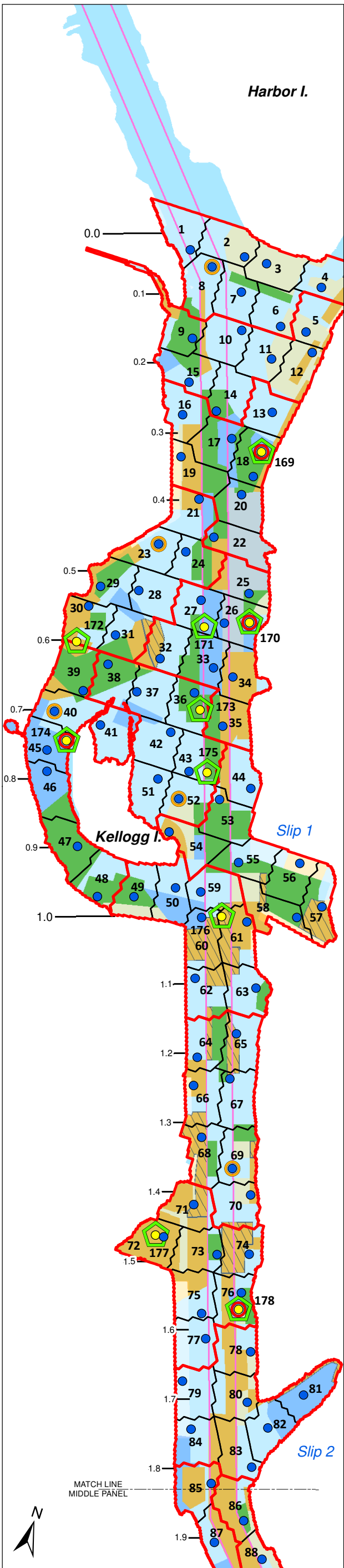
Map 4-1. Baseline surface sediment (0-10 cm) composite areas

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Prepared by craigh, 1/11/2018, W:\Projects\Duwamish ACCS\GIS\Maps and Analyses\Task 03 OAPPs\Surface Sediment\Map 4-2 6516 Surface sediment sampling plan w\Fleming.mxd



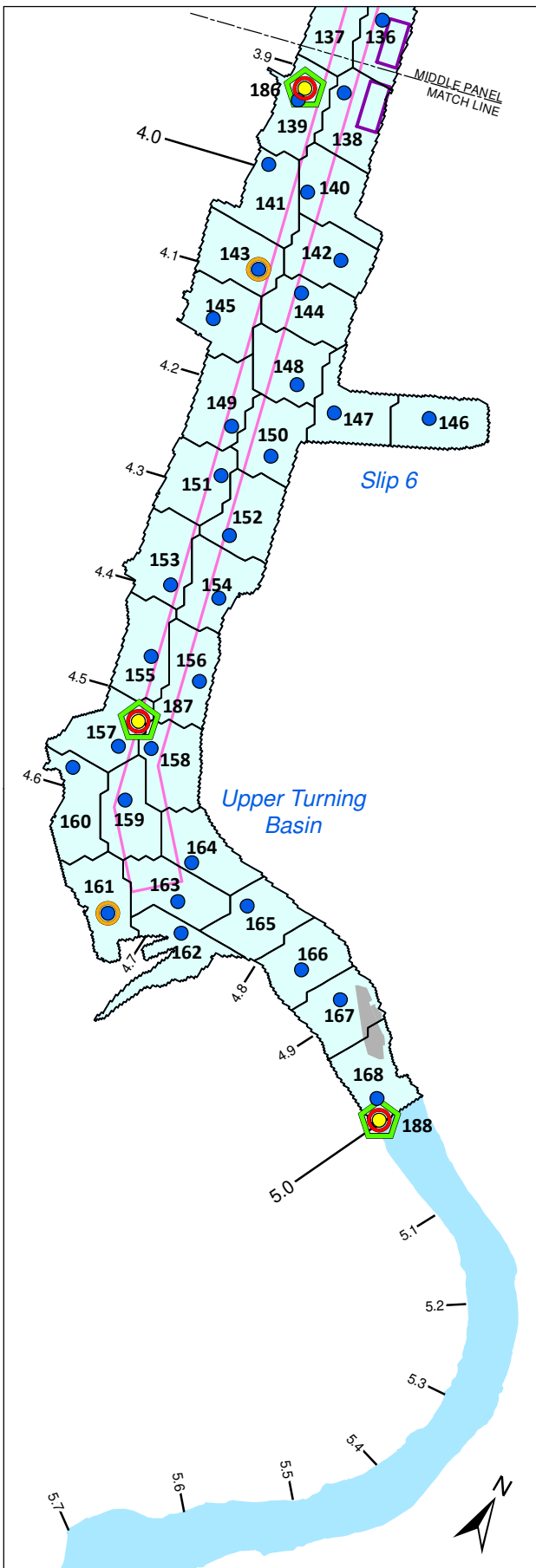
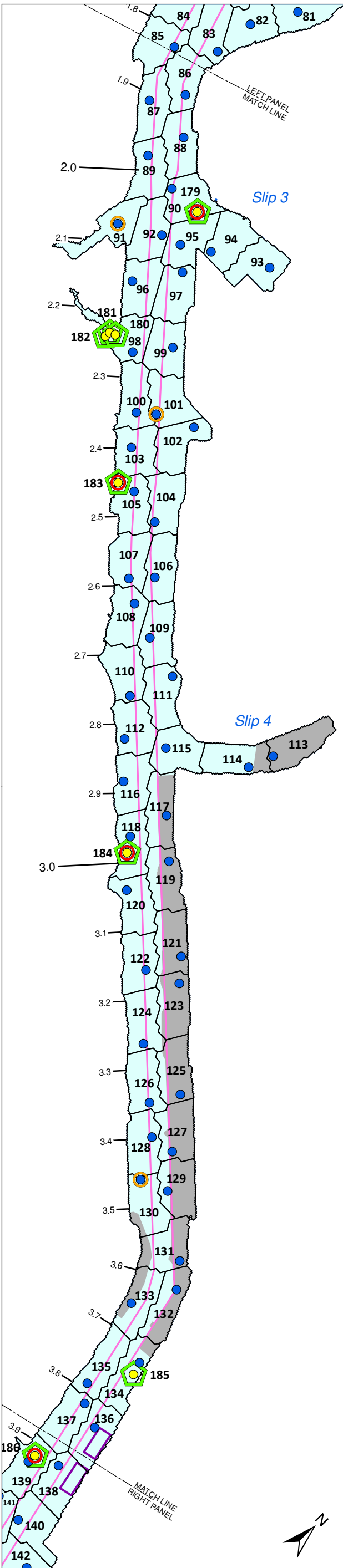
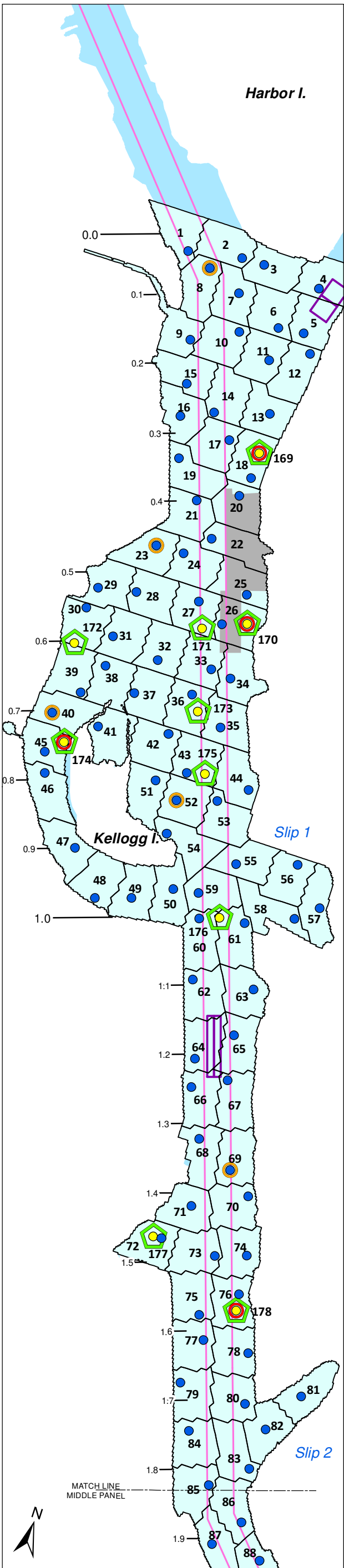
- Baseline surface sediment location (0-10 cm)**
- Random location
 - Reoccupied location
 - Individual location for RAO 3 evaluation (random location in MNR area)
 - Individual location for RAO 3 evaluation (re-occupation of SCO exceedance in RI/FS dataset)
 - Individual location for ex-situ PCB porewater
- Sampling area**
- Sampling area
 - Composite area
- Technology assignment**
- Dredge
 - Partial Dredge and Cap
 - Cap
 - ENR/*in situ*
 - Monitored Natural Recovery (Surface Sediment >SCO)
 - Monitored natural recovery (Surface sediment <SCO)
 - EAA
 - Navigation Channel
 - River mile

Map 4-2. Baseline surface sediment (0-10 cm) sampling locations with technology assignments

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environmental LLC

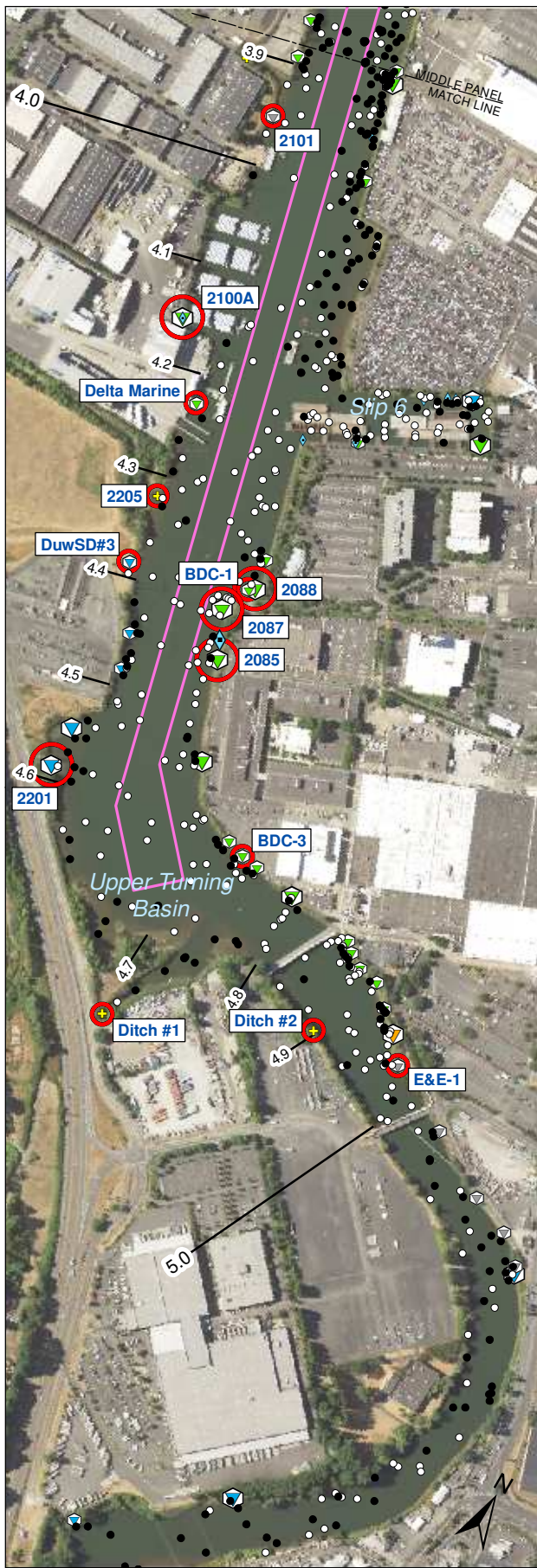
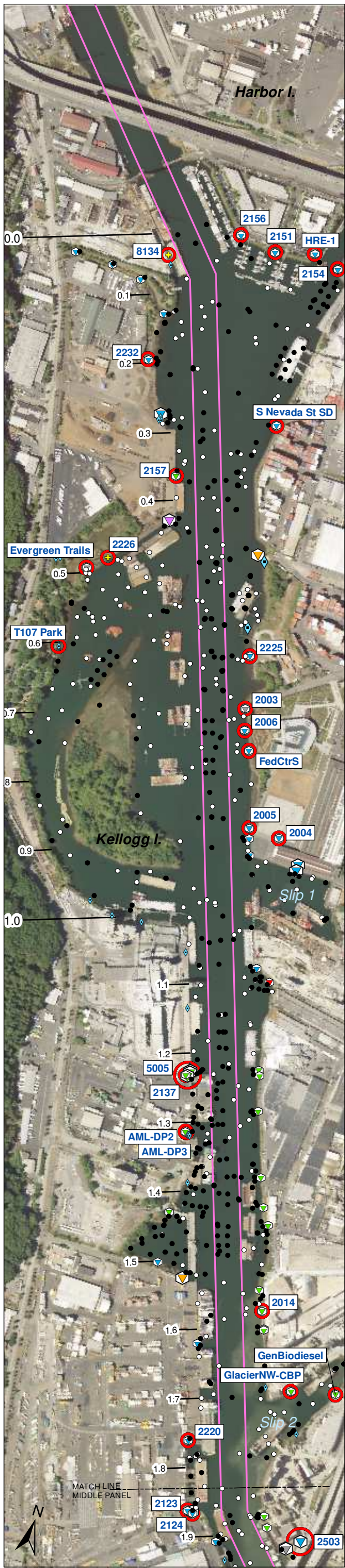
Lower Duwamish Waterway Group
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0 0.1 0.2 Miles
0 0.2 0.4 Kilometers
Scale is the same for each inset map



- Baseline surface sediment location (0-10 cm)**
- Random location
 - Reoccupied location
 - Individual location for RAO 3 evaluation (random location in MNR area)
 - Individual location for RAO 3 evaluation (re-occupation of SCO exceedance in RI/FS dataset)
 - ⬡ Individual location for ex-situ PCB porewater
 - Sampling area
 - AC pilot plot
 - Early Action Area
 - LDW Superfund Boundary
 - Navigation Channel
 - River mile

Map 4-3. Baseline surface sediment (0-10 cm) sampling locations and sample uses



Leidos (2014) identified outfalls

○ ○ Active outfall buffer^a

Outfall classification

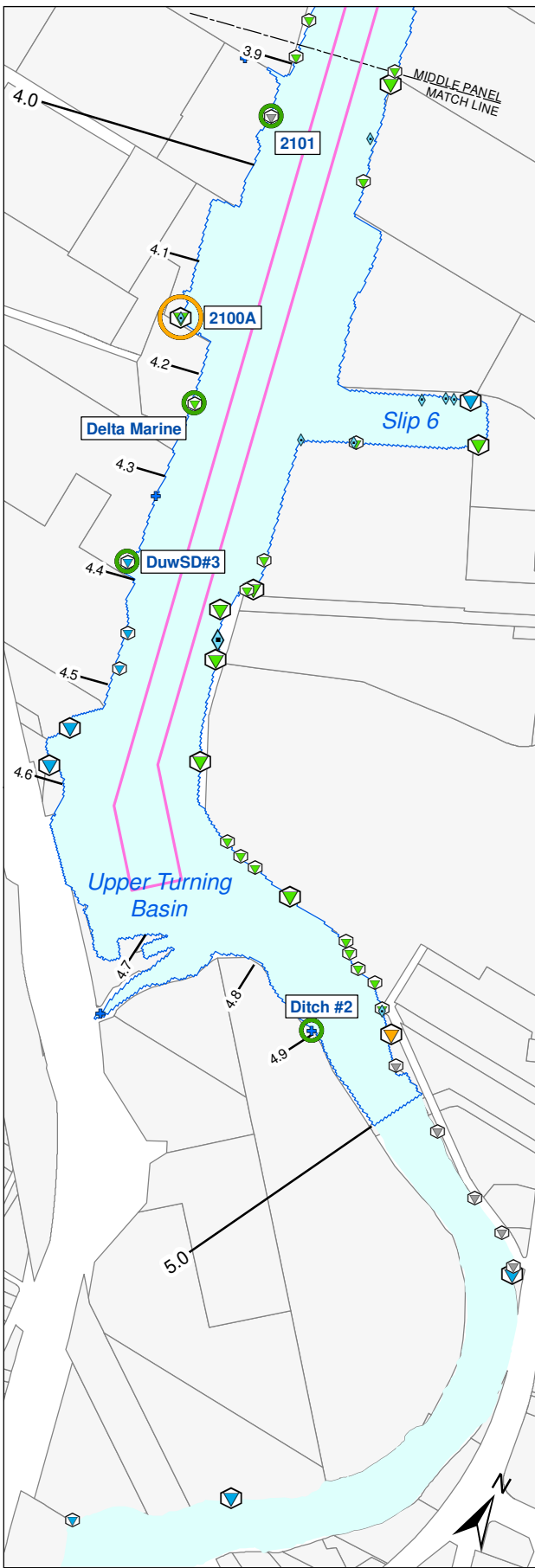
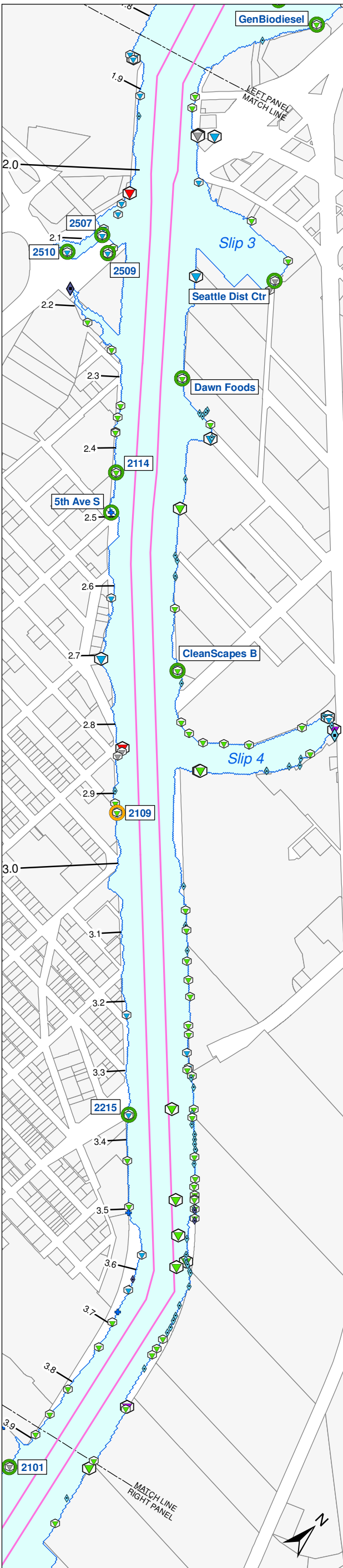
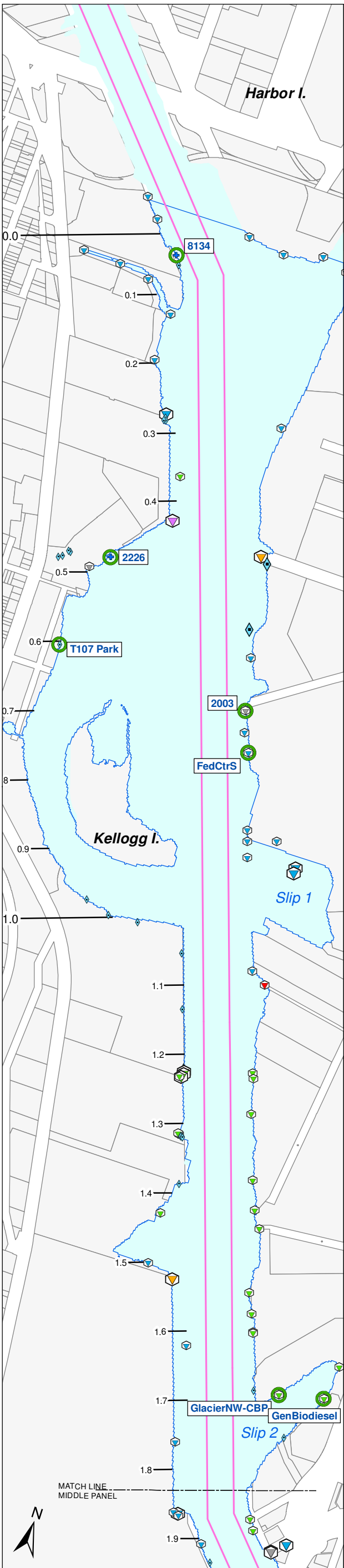
- | ≤24 in | >24 in | |
|--------|--------|--------------------------------------|
| | | CSO |
| | | CSO/storm drain |
| | | EOF |
| | | EOF/storm drain |
| | | Private storm drain |
| | | Public storm drain |
| | | Pipe of unresolved origin and/or use |
| | | Abandoned |
| | | Not an outfall |
| | | Stream, channel, or swale |

- Post-1999 RI/FS or Task 2 surface sediment sampling location
- Pre-2000 RI/FS or Task 2 surface sediment sampling location
- Navigation Channel
- River mile

^a Outfalls with a diameter ≤ 24 inches have a 50 ft buffer; outfalls with a diameter > 24 inches have a 100 ft buffer.

Map 4-4. Active outfalls within the LDW identified by Leidos (2014) for potential near-outfall sediment sampling

Prepared by craigh_12/19/2017: W:\Projects\Duwamish AOC3 GIS Maps and Analyses\Task 03 OAPPs\Surface Sediment\Map 4-5 6666 Outfalls to be sampled.mxd



Outfalls to be sampled for nearby sediment

Active outfall buffer^a

- 1 sample
- 2 samples

Outfall classification

- | ≤24 in | >24 in | |
|--------|--------|--------------------------------------|
| | | CSO |
| | | CSO/storm drain |
| | | EOF |
| | | EOF/storm drain |
| | | Private storm drain |
| | | Public storm drain |
| | | Pipe of unresolved origin and/or use |
| | | Abandoned |
| | | Not an outfall |
| | | Stream, channel, or swale |

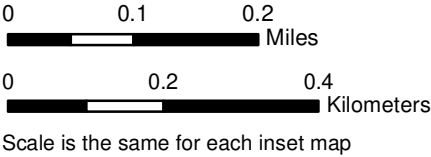
- King Co tax parcel
- LDW Superfund Boundary
- Navigation Channel
- River mile

^a Outfalls with a diameter ≤ 24 inches have a 50 ft buffer; outfalls with a diameter > 24 inches have a 100 ft buffer.

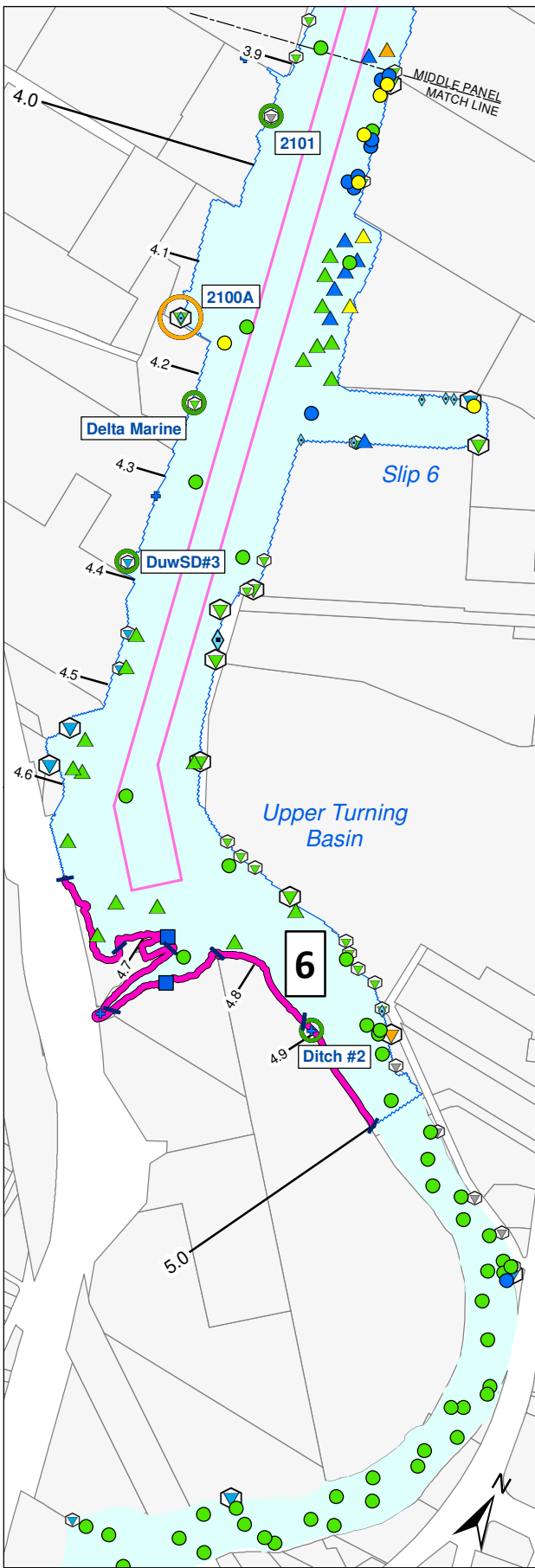
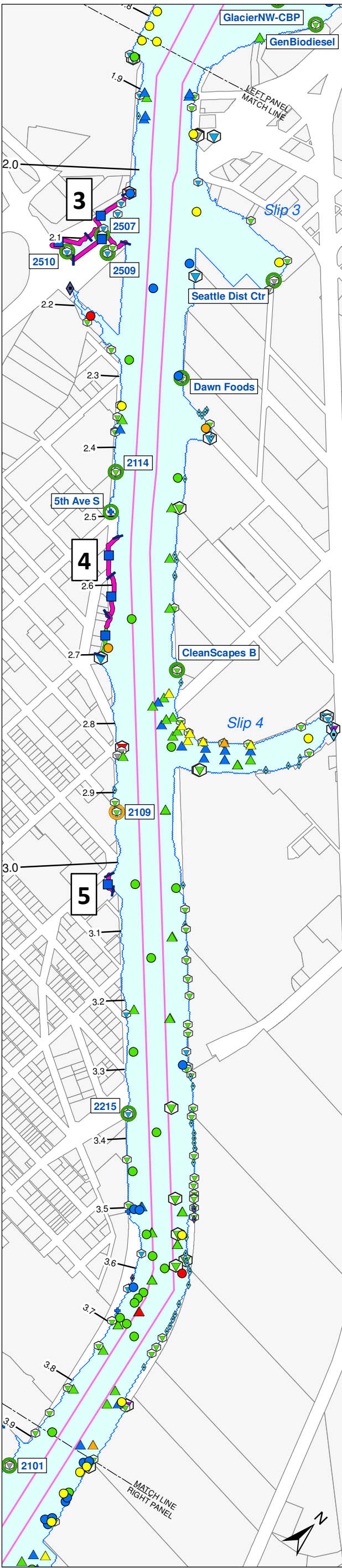
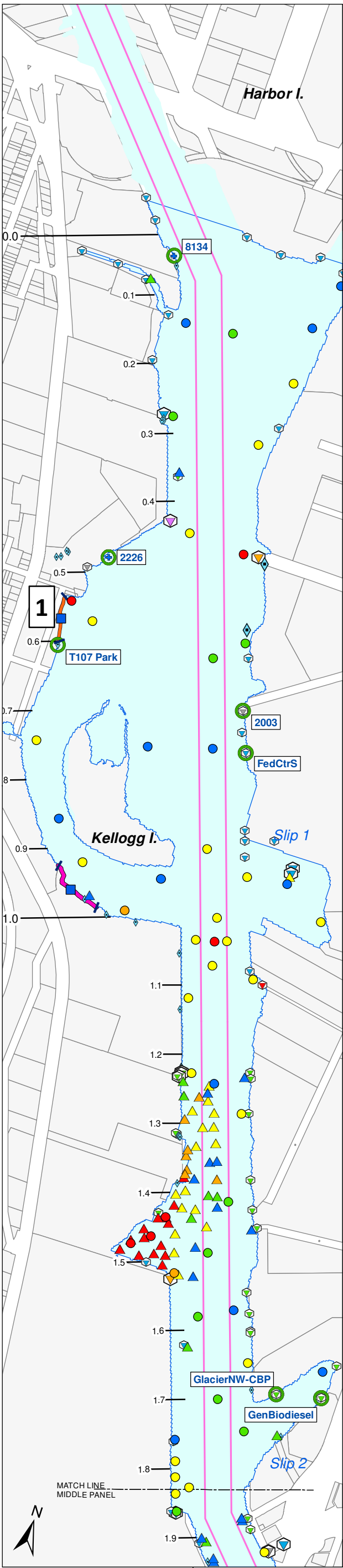
Map 4-5. Outfalls for near-outfall sediment sampling



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Prepared by craigh, 1/11/2018, W:\Projects\Duwamish AOCs\GIS\Maps and Analyses\Task 03 QAPPs\Surface Sediment\Map 4-6 6898 DF sediment data and source sampling locs.mxd



RI/FS dioxin/furan TEQ (ng/kg dw)

- > 50
- > 25 and ≤ 50
- > 10 and ≤ 25
- > 5.0 and ≤ 10
- ≤ 5.0

Post RI/FS dioxin/furan TEQ (ng/kg dw)

- ▲ > 50
- ▲ > 25 and ≤ 50
- ▲ > 10 and ≤ 25
- ▲ > 5.0 and ≤ 10
- ▲ ≤ 5.0

Outfalls to be sampled for nearby sediment

Outfall classification

≤24 in >24 in

- CSO
- CSO/storm drain
- EOF
- EOF/storm drain
- Private storm drain
- Public storm drain
- Pipe of unresolved origin and/or use
- Abandoned
- Not an outfall
- Stream, channel, or swale

Active outfall buffer^a

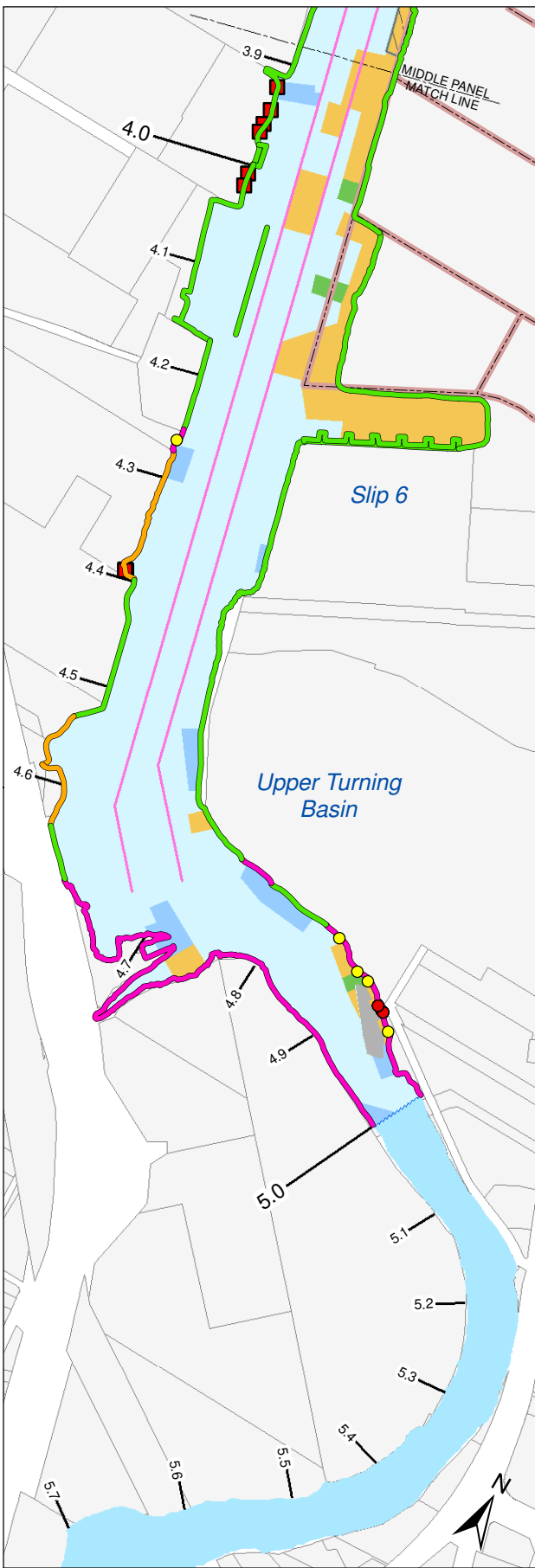
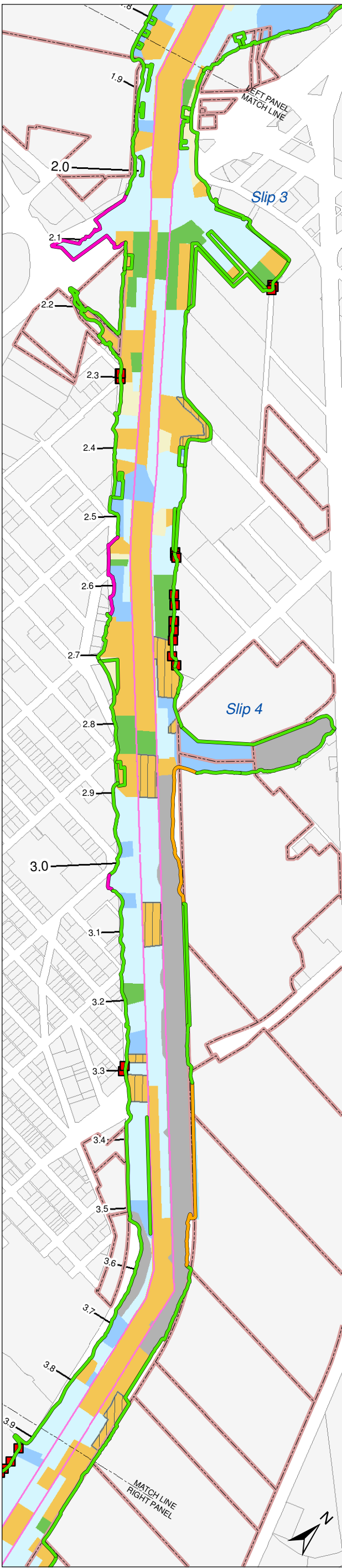
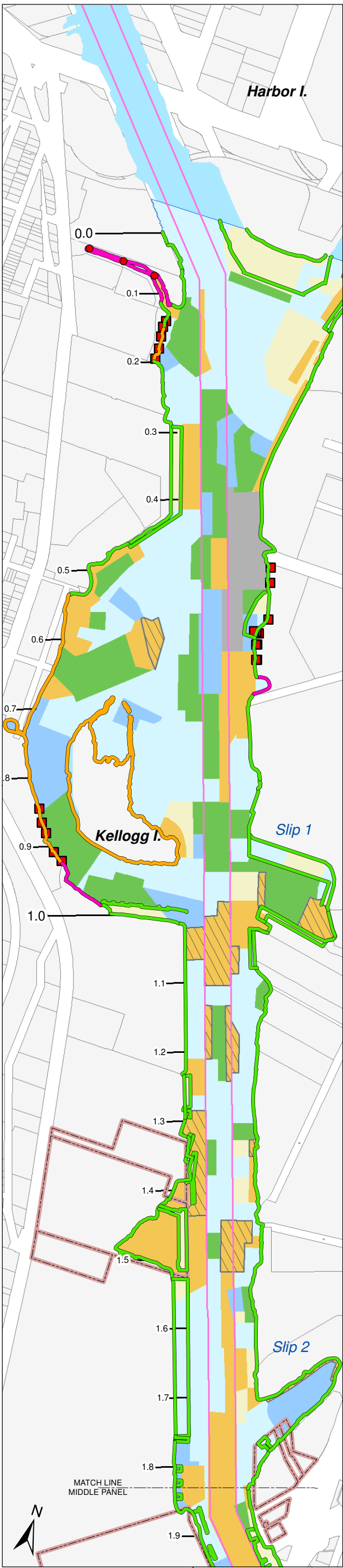
- 1 sample
- 2 samples

Bank classification^b

- Exposed bank - not characterized/ sampleable
- Exposed bank - characterized
- Armored slope
- King Co tax parcel
- LDW Superfund Boundary
- Navigation Channel
- River mile

^a Outfalls with a diameter ≤ 24 inches have a 50 ft buffer; outfalls with a diameter ≥ 24 inches have a 100 ft buffer.
^b These classifications are modified from the FS based on updated information. Bank is defined as +4 to +12 MLLW. Characterization based on Leidos maps produced for Ecology and existing data.

Map 4-6. Existing dioxin/furan sediment data and source-related sampling locations



- Existing bank sample location^a
- Task 2 sample location^b
- RI/FS sample location^b
- Bank classification^c**
 - Exposed bank - characterized
 - Exposed bank - not characterized
 - Armored slope/dock face/vertical bulkhead
- Technology assignment**
 - Dredge
 - Partial Dredge and Cap
 - Cap
 - ENR/*in situ*
 - Monitored Natural Recovery (Surface Sediment >SCO)
 - Monitored natural recovery (Surface sediment <SCO)
 - EAA
 - Listed site
 - King Co tax parcel
 - LDW Superfund Boundary
 - Navigation Channel
 - River Mile

^a King County 2005, Ecology 2011, Port of Seattle 2014, Port of Seattle 2015.

^b Samples collected within 12 feet of the FS shoreline in exposed bank areas that have not been characterized.

^c These classifications are modified from the FS based on updated information. Bank is defined as +4 to +12 MLLW. Characterization based on Leidos maps produced for Ecology.

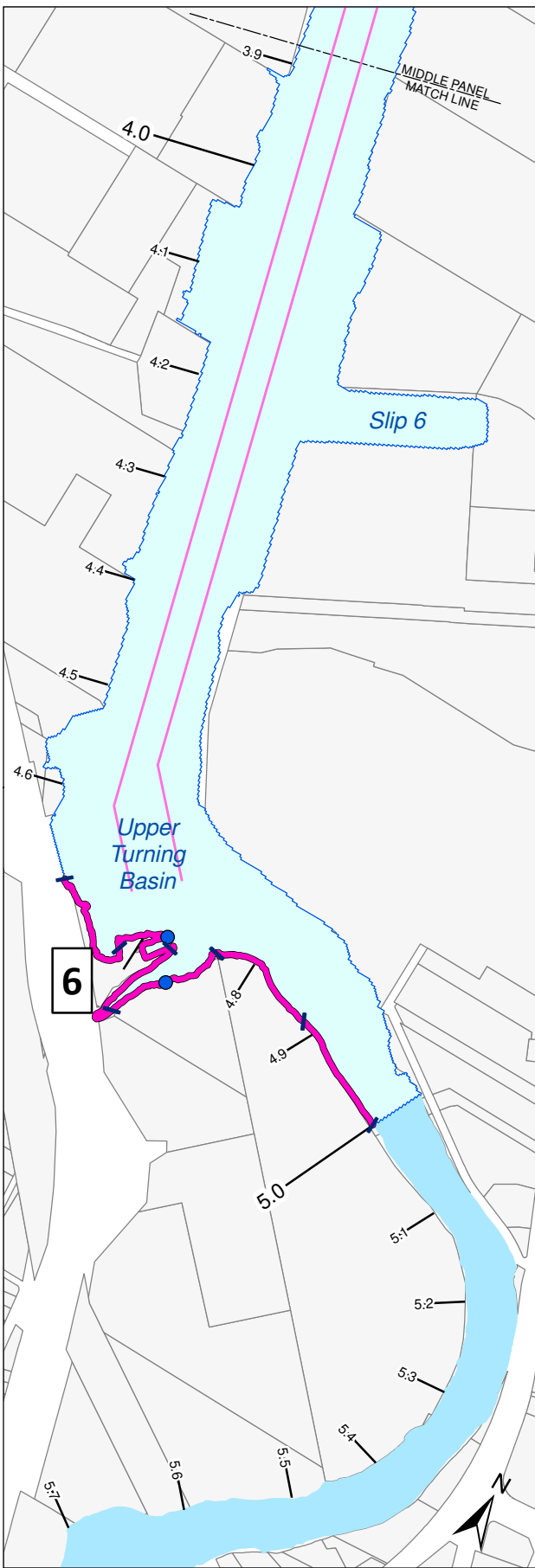
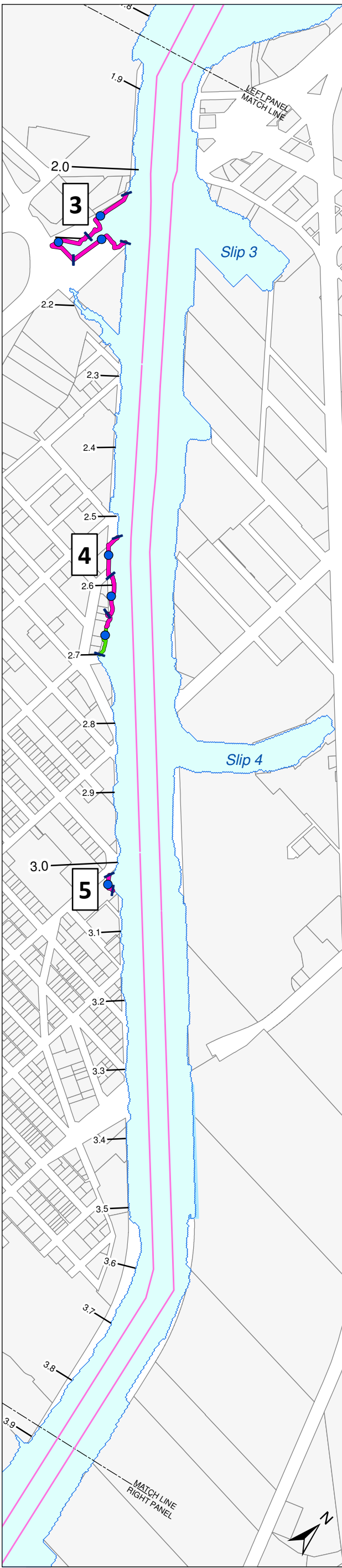
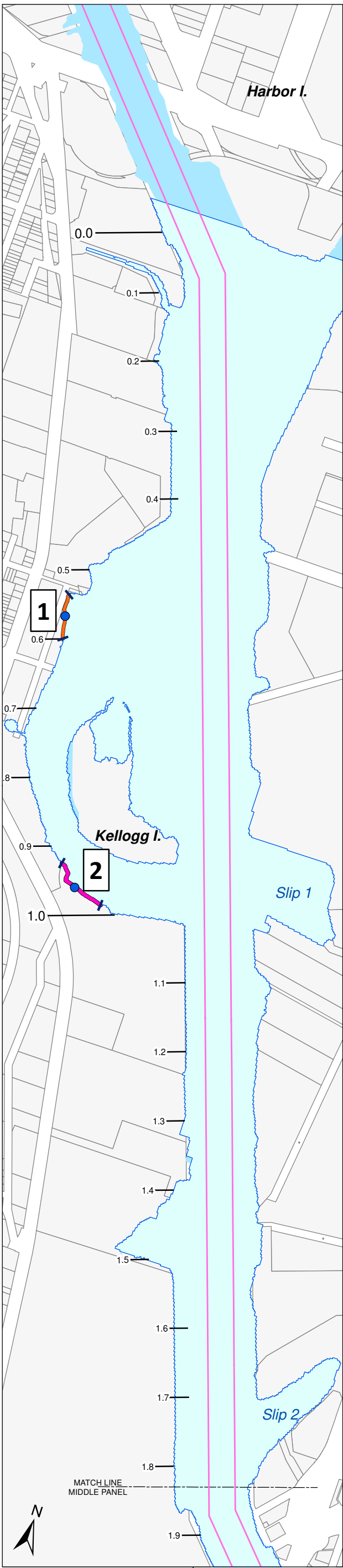
Map 4-7. Bank classifications and existing bank sample locations

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0 0.1 0.2 Miles
0 0.2 0.4 Kilometers
Scale is the same for each inset map

Prepared by craigh, 1/11/2018; W:\Projects\Duwamish ACCS\GIS\Maps and Analyses\Task 03 OAPPs\Surface Sediment\Map 4-8 6565 Proposed bank samples and shoreline.mxd



- Bank sample location
- Upstream/downstream bank sample boundary
- Bank classification^a**
 - Exposed bank - not characterized/sampleable
 - Exposed bank - characterized
 - Armored slope
 - King Co tax parcel
 - LDW Superfund Boundary
 - Navigation Channel
 - River Mile

^a These classifications are modified from the FS based on updated information. Bank is defined as +4 to +12 MLLW. Characterization based on Leidos maps produced for Ecology and existing data.

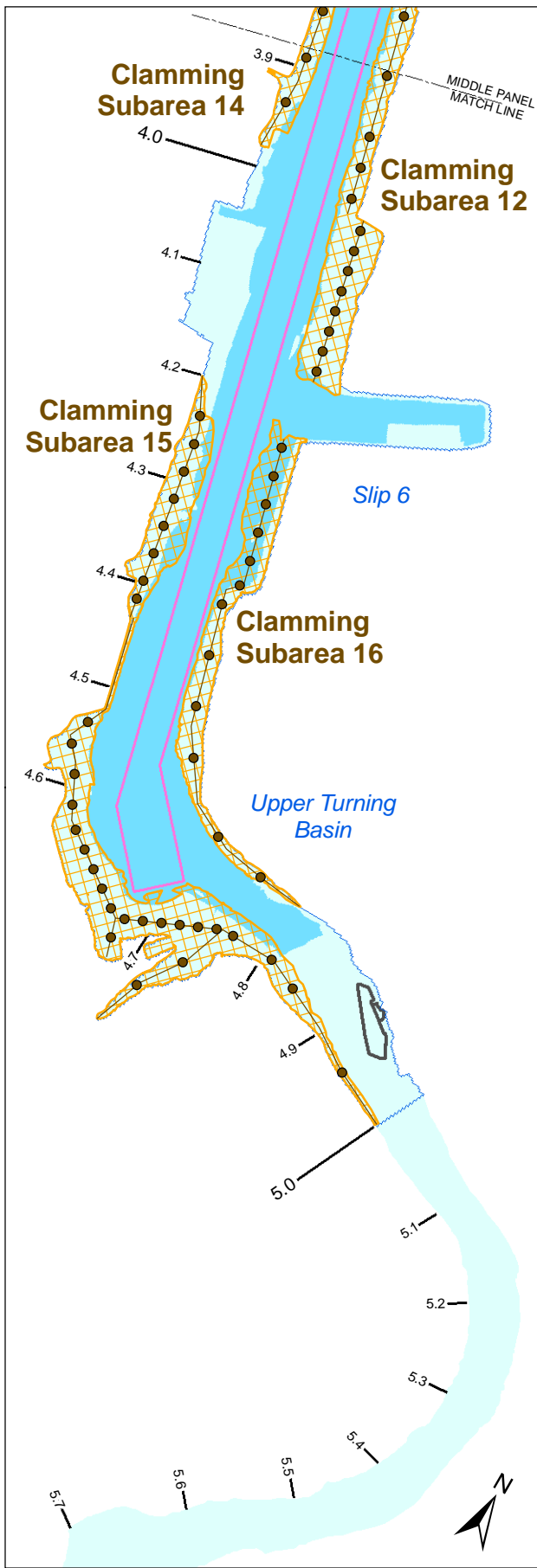
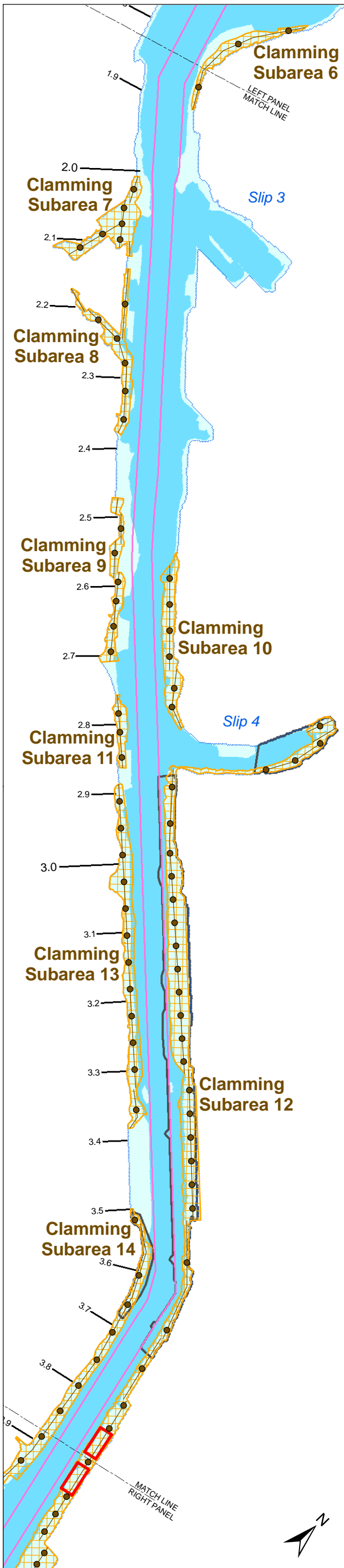
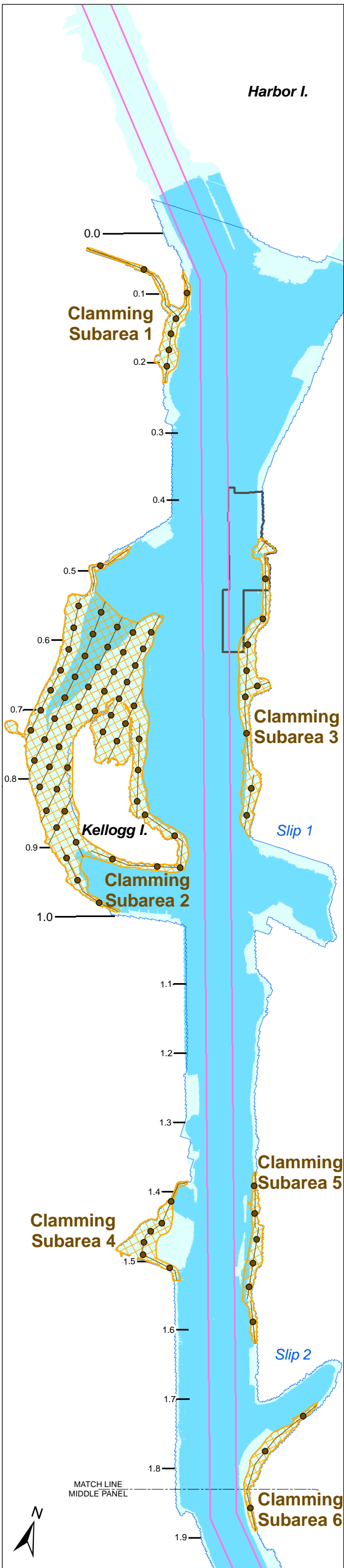
Map 4-8. Bank sample locations

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0 0.1 0.2 Miles
0 0.2 0.4 Kilometers
Scale is the same for each inset map

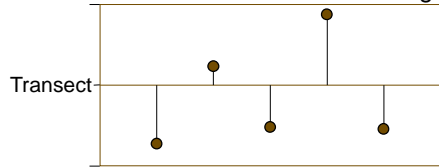
Prepared by: miley, 5/29/2018, W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Task 03 OAPPs\Surface Sediment\Map 4-9 6517 Intertidal sampling plan - clamming areas.mxd



- Potential clamming area sediment sampling location
- Potential clamming area sediment sampling transect
- Potential clamming area
- AC pilot plot
- Bathymetry < -2 ft MLLW^a
- Bathymetry > -2 ft MLLW or no data^a
- Early Action Area
- LDW Superfund Boundary
- Navigation Channel
- River mile

^a -2 ft MLLW bathymetry shown to indicate, in general, areas that may not be sampleable because the areas are below the water line when sampling under the targeted low tide.

Actual sampling locations will be located random distances from the transect in alternating directions.



Map 4-9. Baseline potential clamming area surface sediment (0-45 cm) sampling locations

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0 0.1 0.2
Miles

0 0.2 0.4
Kilometers

Scale is the same for each inset map

Prepared by craigh, 5/10/2018, W:\Projects\Duwamish AOCs\GIS\Maps and Analyses\Task 03 QAPPs\Surface Sediment\Map 4-10 6517 Interidal sampling plan - beach play areas.mxd

